S.No	Parameters	PD	NC
1	Sampling frequency	128 Hz	128 Hz
2.	No of subjects	20	20
3.	No of emotions	6	6
4.	No of trials per emotion	6	6
5.	No of EEG Channels	14	14
6.	Length of EEG data in each file	7000	7000
7.	Samples used for analysis	In order to have a uniform length of data for all the signals (because the signals has a length of 7000 samples (approx), we considered **6400 samples for each EEG record** (by eliminating 300 samples from the top and bottom of each file).	
8.	Channel names	AF3, F7, F3, FC5, T7, P7, O1, O2, P8, T8, FC6, F4, F8, AF4	
9.	Emotions representation	**E1 – Sad** **E2 - Happy** **E3 - Fear** **E4 - Disgust** **E5 - Surprise** **E6 – Anger**	**E1 – Sad** **E2 - Happy** **E3 - Fear** **E4 - Disgust** **E5 - Surprise** **E6 – Anger**
10.	Preprocessing	6_{th} order IIR Butterworth filter with 0 -49 Hz	6_{th} order IIR Butterworth filter with 0 -49 Hz

Deep Learning Analysis:
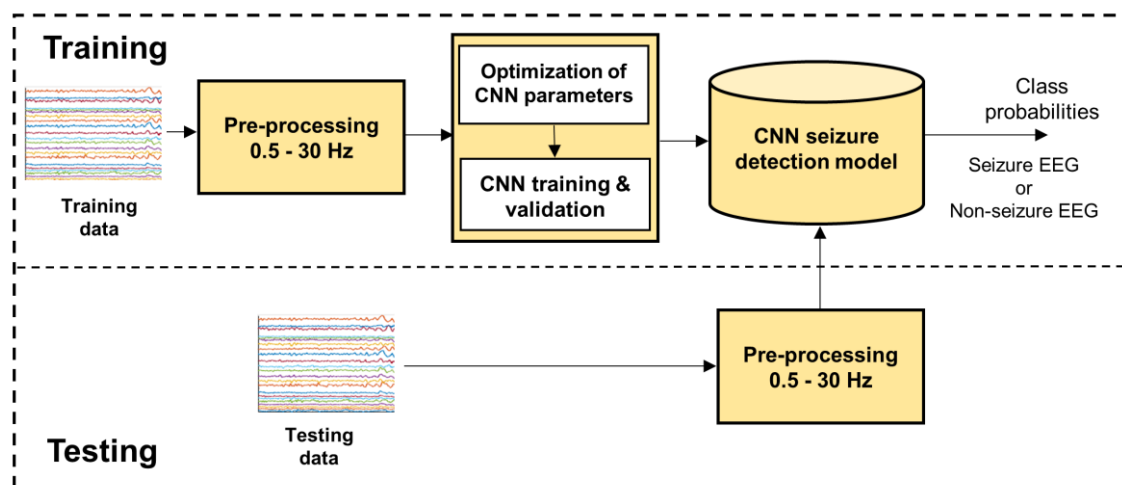
Objective:

1. **To identify the difference in recognizing the emotions between PD and NC.**

Methods:

1. **Four frequency bands**
   a) **Alpha (8 – 13)**
   b) **Beta (13 – 30) Hz**
   c) **Gamma (30 – 49) Hz**
   d) **ALL (8 – 49) Hz**

Deep Learning Parameters:

Keras

Convolutional Neural Network

S.No	Parameters	PD
1	Number of convolution layers	1, 2, 3, 4
2.	Number of pooling layers	1, 2, 3
3.	Number of fully connected layers	1, 2, 3
4.	Number of convolution filters	4, 8, 16, 32, 64
5.	Dimension of convolution filters	1×3, 1×4, 1×5, 1×6, 1×7, 1×8 each
6.	Number of hidden layer neurons	100, 500, 1000, 1500, 2000, 3000
7.	Activation functions	ReLu, tanh, sigmoid
7.	Dropout probability	0.5
8.	Optimization function	Adam optimizer with a learning rate of 10^{-3}
9.	Maximum number of iterations	20000
10.	Performance measures	Sensitivity, Specificity, Precision, Recall, Loss
11.	Output mapping function	Softmax [0, 1]
12.	Training termination criteria	Until the validation error stopped improving

Model Diagram

CNN Structure Diagram

Output layer (cl. probabilities)

Fully connected hidden layer

Feature maps for layer N

Pooling layer

ReLu

Convolutional layer

Convolutional hidden layer C^N

Pooling layer

ReLu

Convolutional layer

Convolutional hidden layer C^1

✱

EEG channels

Input, X

Time (sec)